PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of	
REDEKER et al.	Examiner: Edwards, Laura Estelle
Application No: 10/734,704	Art Unit: 1734
Filed: December 12, 2003	Docket No.: LAM2P461
For: METHOD AND APPARATUS FOR SEMICONDUCTOR WAFER PLANARIZATION	Date: May 22, 2007

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on May 22, 2007.

Signed: _____
Kenneth D. Wright

REPLY BRIEF

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Reply Brief is in response to the Examiner's Answer dated March 22, 2007. This Reply Brief is filed within the two-month time period extending to May 22, 2007. Please enter the following remarks.

The Listing of Claims on Appeal begins on page 2 of this Reply Brief.

Remarks/Arguments begin on page 7 of this Reply Brief.

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TRANSMITTAL OF REPLY BRIEF
(PATENT APPLICATION -- 37 CFR 1.193)

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
Alexandria, VA 22313-1450

Sir:

This Reply Brief is in response to the Examiner's Answer mailed March 22, 2007. The due date for this Reply Brief is May 22, 2007.

Applicants believe that no fees are due in connection with the filing of this Reply Brief. However, the Commissioner is authorized to charge any required fees unknown to the Applicants to Deposit Account No. 50-0850, (Order No. LAM2P461). One additional copy of this transmittal is enclosed for potential fee processing.

Respectfully submitted,
MARTINE PENILLA & GENCARELLA, LLP

Kenneth D. Wright
Reg. No. 53,795

710 Lakeway Drive, Suite 200
Sunnyvale, CA 94085
(408) 749-6900
Customer No. 25920

LISTING OF CLAIMS ON APPEAL

1. An apparatus for depositing a planarizing layer over a wafer, comprising:

a tank defined by a bottom and an enclosing wall, the tank being configured to contain an electroless plating solution;

a wafer support structure disposed within the tank, the wafer support structure being configured to support a wafer at a submerged position within the electroless plating solution to be contained within the tank;

a planar member disposed above and substantially parallel to the wafer support structure, the planar member capable of being positioned proximate to the wafer to be supported by the wafer support structure such that the planar member serves as an upper confinement boundary for material deposited on the wafer through electroless plating reactions; and

a radiant energy source disposed above the planar member and above the wafer support structure, the radiant energy source being oriented to direct radiant energy through the planar member and to the wafer to be supported by the wafer support structure.

2. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, the planar member being composed of a material capable of transmitting radiant energy emitted from the radiant energy source toward the wafer support structure.

3. An apparatus for depositing a planarizing layer over a wafer as recited in claim 2, wherein the planar member is formed from one of quartz, sapphire, and polymer.

4. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, wherein the radiant energy source is configured to generate radiant energy having

a wavelength range that is capable of selectively heating a material present at a surface of the wafer upon which the radiant energy will be incident.

5. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, wherein the radiant energy source is configured to apply a substantially uniform amount of the radiant energy over a surface of the wafer upon which the radiant energy will be incident.

6. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, wherein the planar member is broadly flexible and locally rigid.

7. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, further comprising:

a backing member disposed against a backside of the planar member, the backside of the planar member facing away from the wafer support structure, the backing member being configured to control a planarity of the planar member.

8. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, further comprising:

an inlet for supplying the electroless plating solution to the tank; and

an outlet for removing the electroless plating solution from the tank.

9. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, further comprising:

a heat exchanger capable of maintaining a temperature of the electroless plating solution to be contained within the tank.

21. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, wherein the planar member is capable of being positioned within three micrometers of a top surface of the wafer to be supported by the wafer support structure.

22. An apparatus for depositing a planarizing layer over a wafer, comprising:

a tank defined by a bottom and an enclosing wall, the tank being configured to contain an electroless plating solution;

a wafer support structure disposed within the tank, the wafer support structure being configured to support a wafer at a submerged position within the electroless plating solution to be contained within the tank;

a planar member disposed above and substantially parallel to the wafer support structure, the planar member capable of being positioned proximate to the wafer to be supported by the wafer support structure such that the planar member serves as an upper confinement boundary for material deposited on the wafer through electroless plating reactions; and

a radiant energy source disposed above the planar member and above the wafer support structure, the radiant energy source being oriented to direct radiant energy through the planar member such that a substantially uniform amount of radiant energy is applied to a top surface of the wafer to be supported by the wafer support structure.

23. An apparatus for depositing a planarizing layer over a wafer as recited in claim 22, further comprising:

radiant energy reflecting surfaces disposed within the tank to facilitate uniform application of the radiant energy to the top surface of the wafer.

24. An apparatus for depositing a planarizing layer over a wafer, comprising:

a tank defined by a bottom and an enclosing wall, the tank being configured to contain an electroless plating solution;

a wafer support structure disposed within the tank, the wafer support structure being configured to support a wafer at a submerged position within the electroless plating solution to be contained within the tank;

a planar member disposed above and proximate to the wafer to be supported by the wafer support structure such that the planar member serves as an upper confinement boundary for material deposited on the wafer through electroless plating reactions;

a backing member disposed against a backside of the planar member, the backside of the planar member facing away from the wafer support structure, the backing member being configured to control a planarity of the planar member; and

a radiant energy source disposed to direct radiant energy through the planar member and to the wafer to be supported by the wafer support structure.

25. An apparatus for depositing a planarizing layer over a wafer as recited in claim 24, wherein the backing member is defined to apply a differential pressure distribution through the planar member to a planarizing surface of the planar member, the planarizing surface of the planar member facing toward the wafer support structure.

26. An apparatus for depositing a planarizing layer over a wafer as recited in claim 25, wherein the backing member includes a distribution of materials having varying

spring constants for applying the differential pressure distribution through the planar member.

27. An apparatus for depositing a planarizing layer over a wafer as recited in claim 25, wherein the backing member includes a number of fluid filled chambers for applying the differential pressure distribution through the planar member.

REMARKS/ARGUMENTS

This Reply Brief is in response to the Examiner's Answer dated March 22, 2007. This Reply Brief is filed within the two-month time period extending to May 22, 2007.

New Grounds of Rejection in Examiner's Answer

In the Final Office Action dated May 23, 2006, in rejecting claims 1-7, 22, and 24 under 35 U.S.C. 102(b) as anticipated by, or in the alternative under 35 U.S.C. 103(a) as being obvious over Sandaiji, the Examiner specifically states the following with regard to the backing member feature of the pending claims:

"With respect to a backing member, see lens system (10)."

Other than simply citing the lens system (10) of Sandaiji, it should be noted that the Examiner does not provide any further discussion as to how Sandaiji is asserted to teach the backing member of the pending claims.

However, in the Examiner's Answer dated March 22, 2007, in rejecting claims 1-7, 22, and 24 under 35 U.S.C. 102(b) as anticipated by, or in the alternative under 35 U.S.C. 103(a) as being obvious over Sandaiji, the Examiner specifically states the following:

"With respect to a backing member, see lens system (10) against or oppose to the planar member or even immersed arms (not numbered) of adjustment mechanism (6) against or oppose to the planar member (7)."; and

"Alternatively, the immersed arms (not numbered) of adjustment mechanism (6) can be construed as a backing member against or in contact with the planar member (7). In that instance, the planarity or flatness of the planar member would be controlled by the degree of pressure applied by the arms."

The above-identified differences between the Final Office Action and the Examiner's Answer with regard to the rejections of claims 1-7, 22, and 24 under 35 U.S.C.

102(b) as anticipated by, or in the alternative under 35 U.S.C. 103(a) as being obvious over Sandaiji, constitutes a new ground of rejection in the Examiner's Answer. Although a new ground of rejection in the Examiner's Answer is permitted, the new ground of rejection must be prominently identified and approved by a Technology Center Director or designee. The Applicants submit that the new ground of rejection is not prominently identified as such. Also, the Applicants submit that the new ground of rejection does not appear to have been approved by a Technology Center Director or designee.

Despite the inconspicuous provision of the new ground of rejection in the Examiner's Answer and the lack of approval by a Technology Center Director or designee of the Examiner's Answer, the Applicants wish to maintain the Appeal. To this end, the Applicants provide a response to the new ground of rejection in the present Reply Brief.

Response to Examiner's Answer

Notwithstanding the new grounds of rejection as discussed above, the Applicants' arguments presented in the Appeal Brief of November 27, 2006, remain applicable to the claim rejections on appeal. In the interest of brevity, the Applicants respectfully request the Board of Patent Appeals and Interferences ("Board" hereafter) to refer to the Applicants' Appeal Brief of November 27, 2006, for a more detailed explanation of the Applicants' position with respect to the Examiner's rejections. The remainder of the present Reply Brief responds specifically to the Examiner's comments as provided in the "Response to Arguments" section of the Examiner's Answer dated March 22, 2007.

With regard to the rejections of claims 1-8 and 22-24 under 35 U.S.C. 102 as being anticipated by Montierth, the Examiner continues to assert that the vibrational member 3802b of Montierth (see Fig. 38) teaches the planar member recited in the pending claims. Specifically, the Examiner asserts that because Montierth supposedly teaches that the work

support (vibrational member 3802a) can be of different thickness in different embodiments, Montierth teaches the presently claimed features regarding the planar member capable of being positioned proximate to the wafer to be supported by the wafer support structure, such that the planar member serves as an upper confinement boundary for material deposited on the wafer through electroless plating reactions.

The Examiner has incorrectly asserted that the embodiments disclosed in Figures 1A and 38 of Montierth are related as variations of one another. The embodiment shown in Fig. 38 of Montierth is not disclosed by Montierth as being a modification of the embodiment disclosed in Fig. 1A of Montierth, vice-versa. Therefore, it is not appropriate to construe a particular feature (e.g., the vibrational member 3802a) in Fig. 38 of Montierth as representing a modification of a corresponding feature (e.g., the vibrational member 104) in Fig. 1A of Montierth, vice-versa. Consequently, the Examiner's assertion that the vibrational member 3802a in the embodiment of Fig. 38 of Montierth represents a modification of the vibrational member 104 in the embodiment of Fig. 1A of Montierth is without basis in fact.

Moreover, the embodiment shown in Figure 1A of Montierth does not even include a structure overlying the substrate 102. Therefore, the embodiment shown in Figure 1A of Montierth cannot be reasonably construed to represent an apparatus for depositing a planarizing layer over a wafer, wherein the apparatus includes a planar member disposed above and substantially parallel to the wafer support structure, as recited in the pending claims. Consequently, the Examiner's assertion that the depicted height of the vibrational member 104 in the embodiment of Figure 1A of Montierth has anything to do with the positioning of a overlying planar member proximate to the wafer is without basis in fact.

Furthermore, Montierth (Fig. 38) does not show the substrate 3800 as being supported by the vibrational member 3802a. In fact, Montierth [0453] teaches "The

distance separating the vibrational member and the substrate could range from between 1 micron to about several inches or more." Therefore, Montierth explicitly teaches that the vibrational member 3802a is not a substrate (i.e., wafer) support structure. Thus, a change in the height of the vibrational member 3802a would not cause a change in the proximity of the substrate 3800 to an overlying planar member. Consequently, the Examiner's assertion that the height, or change thereof, of the vibrational member 3802a depicted in Fig. 38 of Montierth somehow teaches positioning of the substrate 3800 proximate to an overlying planar member is without basis in fact.

Additionally, each of the pending claims requires that the planar member is capable of being positioned proximate to the wafer to be supported by the wafer support structure such that the planar member serves as an upper confinement boundary for material deposited on the wafer through electroless plating reactions. Montierth includes no teaching whatsoever that the upper vibrational member 3802b is capable of serving as an upper confinement boundary for material deposited on the wafer through electroless plating reactions. The Examiner's reference to Montierth's teachings in paragraph [0455] with regard to enhancing the uniformity of energy exposure on the wafer has no relevance to the features of the pending claims regarding the planar member capable of being positioned proximate to the wafer to be supported by the wafer support structure such that the planar member serves as an upper confinement boundary for material deposited on the wafer through electroless plating reactions.

The Examiner has asserted that the microwave energy referred to by Montierth in paragraph [0482] constitutes a teaching of a radiant energy source as recited in the pending claims. However, Montierth [0482] discloses application of microwaves as a form of vibrational energy, as opposed to radiant energy.

With regard to claim 6, the Examiner has asserted that because Montierth [0626] teaches the use of various materials for the vibrational member, Montierth teaches the planar member being broadly flexible and locally rigid. This assertion by the Examiner requires that there be an equivalence between the vibrational member of Montierth as discussed in paragraph [0626] and the planar member recited in claim 6 (including the features of claim 1). Montierth [0626] specifically states that sonic energy is coupled to the backside of the substrate, and that coupling of the sonic energy to the backside of the substrate is accomplished by bringing the substrate into direct contact with one lateral surface of a vibrational member. Therefore, Montierth [0626] teaches that the vibrational member is coupled to the backside of the substrate. However, the planar member of the pending claims is recited as being disposed above the wafer support structure (and thereby above the wafer present on the wafer support structure). Consequently, there is no equivalence between the planar member of the pending claims and the vibrational member referred to in paragraph [0626] of Montierth. Therefore, material options for the vibrational member as taught by Montierth [0626] do not teach material options for a planar member, such as the planar member recited in each of the pending claims. In following, the Examiner's assertion that because Montierth [0626] teaches the use of various materials for the vibrational member, Montierth teaches the planar member being broadly flexible and locally rigid, is not appropriate.

The Examiner has asserted that because Montierth [0626] teaches piezoelectric crystals attached to a plate to form the vibrational member, Montierth [0626] inherently teaches that the piezoelectric crystals control a planarity of the plate of the vibrational member. Then, the Examiner again asserts that the vibrational member of Montierth [0626] teaches the planar member of the pending claims. The Examiner then asserts that the piezoelectric crystals of Montierth [0626] teach the backing member disposed against the

backside of the planar member, as recited in each of pending claims 7 and 24. As discussed above, the vibrational member of Montierth [0626] does not teach the planar member of the pending claims. Therefore, the above-identified assertions of the Examiner's are inappropriate.

Moreover, the Examiner's assertion that piezoelectric crystals attached to a plate inherently control a planarity of the plate is not true. "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). The Examiner has not established that the mere attachment of piezoelectric crystals to a plate causes the piezoelectric crystals to control a planarity of the plate. The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from teachings of the applied prior art." *Ex parte Lèvy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original). The Applicants submit that the Examiner has failed to provide a basis in fact and/or technical reasoning that supports a determination that mere attachment of piezoelectric crystals to a plate inherently causes the piezoelectric crystals to control a planarity of the plate.

In view of the foregoing, the Applicants submit that Montierth fails to teach each and every feature of each of claims 1-8 and 22-24. Therefore, the Applicants submit that each of claims 1-8 and 22-24 is not anticipated by Montierth under 35 U.S.C. 102.

diameter of the laser beam is on the order of tens of micrometers. The laser of Sandaiji is not defined to apply a substantially uniform amount of radiant energy to the top surface of the wafer. Rather, the laser of Sandaiji is defined to apply radiant energy to the gapped bar at specific locations corresponding to a desired pattern to be etched on the gapped bar. Furthermore, if the laser of Sandaiji were somehow modified to apply the laser beam uniformly to the top surface of the gapped bar, the entire top surface of the gapped bar would be uniformly etched, thus, rendering the apparatus of Sandaiji inoperable with respect to etching a specific pattern in the top surface of the gapped bar. It should be noted that the same arguments provided above with regard to independent claim 22 are also applicable to dependent claim 5.

With regard to claims 7 and 24, the Examiner continues to assert that the lens system (10) of Sandaiji teaches the recited backing member feature. Each of claims 7 and 24 recite the following feature:

"a backing member disposed against a backside of the planar member, ... the backing member being configured to control a planarity of the planar member."

The Examiner asserts that the recitation of the backing member disposed against the backside of the planar member does not require the backing member to contact the planar member. The Applicants strongly disagree with this assertion by the Examiner. The normal usage of the term "against" does convey a meaning of "in contact with." The Examiner's interpretation of the term "against" as meaning "opposed to but not in contact with" is simply not consistent with either the Applicants' specification or the normal meaning of the term.

Because the lens system 10 of Sandaiji has no physical contact with the quartz window 7, it is not reasonable to conclude that the lens system 10 represents a backing member disposed against a backside of the quartz window 7. Also, because the lens system

With regard to the rejections of claims 1-7, 22, and 24 under 35 U.S.C. 102(b) as anticipated by, or in the alternative under 35 U.S.C. 103(a) as being obvious over Sandaiji, the Examiner has asserted that Sandaiji teaches an apparatus equivalent in structure to that recited in the pending claims. The Applicants disagree with this assertion by the Examiner.

The Examiner asserts that the term "proximate," as recited in the pending claims with regard to the position of the planar member relative to the wafer to be supported by the wafer support structure, is unqualified in the claims. However, the claims specifically recite that the planar member is capable of being positioned proximate to the wafer to be supported by the wafer support structure such that the planar member serves as an upper confinement boundary for material deposited on the wafer through electroless plating reactions. Therefore, in the pending claims, the term "proximate" is defined such that the planar member serves as an upper confinement boundary for material deposited on the wafer through electroless plating reactions. In contrast to the Examiner's assertions, Sandaiji does not teach or suggest that the quartz window 7 can be positioned to serve as an upper confinement boundary for material deposited on the gapped bar 4 through electroless plating reactions. Moreover, Sandaiji is silent with regard to electroless plating reactions or an upper confinement boundary for material deposited thereby.

With regard to claim 22, the Examiner has asserted that Sandaiji teaches application of uniform radiant energy, i.e., laser beam energy, to the surface of the substrate, i.e., gapped bar 4. However, this is not true. Sandaiji does not teach the radiant energy source oriented to direct radiant energy through the planar member such that a substantially uniform amount of radiant energy is applied to the top surface of the wafer. Rather, Sandaiji teaches a laser beam 8 emitted from a laser source 9 and irradiated through a lens system 10 and the quartz window 7 onto the gapped bar 4. Sandaiji further teaches that the

10 of Sandaiji has no physical contact with the quartz window 7, it is not reasonable to conclude that the lens system 10 is capable of controlling the planarity of the quartz window 7. Additionally, Sandaiji does not teach that the lens system 10 is defined to control the planarity of the quartz window 7. The Examiner has attempted to invent a scenario in which the lens system 10 of Sandaiji would be capable of intensifying the laser energy so as to deform the quartz window 7 such that a flatness or planarity of the quartz window 7 would be affected. The Applicants submit that Sandaiji simply does not teach the above-mentioned scenario as presented by the Examiner. Furthermore, the Examiner has not cited any support for the above-mentioned scenario in Sandaiji.

The Examiner has provide a new ground of rejection by stating that the immersed arms (not numbered) of the adjustment mechanism 6 of Sandaiji can be construed as a backing member, as recited in each of claims 7 and 24. Sandaiji does not teach or suggest that the immersed arms of the adjustment mechanism 6 represent a backing member disposed against a backside of the planar member. In fact Sandaiji's disclosure with regard to the immersed arms of the adjustment mechanism 6 is limited to what is shown in Figure 1, wherein the immersed arms of the adjustment mechanism 6 are simply depicted as holding the quartz window 7 at its periphery. Also, Sandaiji does not teach or suggest that the immersed arms of the adjustment mechanism 6 are configured to control a planarity of the quartz window 7. Therefore, the Applicants submit that immersed arms of the adjustment mechanism 6 of Sandaiji does not teach the backing member as recited in each of claims 7 and 24.

In view of the foregoing, the Applicants submit that Sandaiji fails to teach each and every feature of each of claims 1-7, 22, and 24. Therefore, the Applicants submit that each of claims 1-7, 22, and 24 is not anticipated by Sandaiji under 35 U.S.C. 102. Also, Sandaiji

fails to teach each and every feature of claims 1-7, 22, and 24, respectively, as required to establish a prima facie case of obviousness under 35 U.S.C. 103.

Because a dependent claim incorporates each and every feature of its independent claim, the dependent claim is patentable for at least the same reasons as its independent claim. Therefore, the Applicants submit that each of dependent claims 2-9, 21, and 23-27 is patentable for at least the same reasons provided for its independent claim.

In view of the foregoing and the argument presented in the Appeal Brief of November 27, 2006, the Board is respectfully requested to overturn the Examiner's rejections of claims 1-9 and 21-27. If the Examiner has any questions concerning the present Reply Brief, the Examiner is requested to contact the undersigned at (408) 774-6914. If any other fees are due in connection with filing this Reply Brief, the Commissioner is also authorized to charge Deposit Account No. 50-0805 (Order No. LAM2P461). A duplicate copy of the transmittal is enclosed for this purpose.

Respectfully submitted,
MARTINE PENILLA & GENCARELLA, LLP

Kenneth D. Wright
Reg. No. 53,795

710 Lakeway Drive, Suite 200
Sunnyvale, CA 94085
Telephone: (408) 749-6900
Customer Number 25920